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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/733,959	12/11/2003	Abdo Esmail Abdo	ROC920020192US1	8764
46296	7590	05/19/2006	[REDACTED]	EXAMINER
MARTIN & ASSOCIATES, LLC				LE, MICHAEL
P.O. BOX 548			[REDACTED]	ART UNIT
CARTHAGE, MO 64836-0548				PAPER NUMBER
				2163

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Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>	
	10/733,959	ABDO ET AL.	
	<b>Examiner</b>	<b>Art Unit</b>	
	Michael Le	2163	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on 11 December 2003.  
 2a) This action is FINAL.                    2b) This action is non-final.  
 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-16 is/are pending in the application.  
 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) Claim(s) \_\_\_\_\_ is/are allowed.  
 6) Claim(s) 1-16 is/are rejected.  
 7) Claim(s) \_\_\_\_\_ is/are objected to.  
 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.  
 10) The drawing(s) filed on 11 December 2003 is/are: a) accepted or b) objected to by the Examiner.  
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
 a) All    b) Some \* c) None of:  
 1. Certified copies of the priority documents have been received.  
 2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
 3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | Paper No(s)/Mail Date. _____  |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
|  | 6) <input type="checkbox"/> Other: _____                                    |

## **DETAILED ACTION**

### ***Summary and Status of Claims***

1. This Office Action is in response to Application No. 10/733,959 filed December 11, 2003.
2. The Specification is objected to for minor informalities.
3. Claims 1-16 are pending.
4. Claims 2-4, 8 and 12-16 are rejected under 35 U.S.C. 112, second paragraph.
5. Claims 1-16 are rejected under 35 U.S.C. 101.
6. Claims 1-16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burger (US Patent Pub. 2004/0059743) in view of Applicant's Admitted Prior Art (AAPA).

### ***Priority***

7. Applicant does not claim any form of priority. Consequently, claims 1-16 have been examined with a priority date of December 11, 2003.

### ***Specification***

8. The disclosure is objected to because of the following informalities:
9. On page 9, line 22, "fo" has to be changed to --of--.  
Appropriate correction is required.
10. The use of the trademarks "IBM", "ESERVER", "ISERIES" on page 8, line 17, and "OS/400" on page 9, line 9 has been noted in this application. It should be capitalized wherever it appears and be accompanied by the generic terminology.

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11. Although the use of trademarks is permissible in patent applications, the proprietary nature of the marks should be respected and every effort made to prevent their use in any manner which might adversely affect their validity as trademarks.

***Claim Rejections - 35 USC § 112***

12. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

13. **Claims 2-4, 8 and 12-16 are rejected under 35 U.S.C. 112, second paragraph,** as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

14. **Claims 2 and 12** recite the limitation "the frequent value table" in lines 9-10 of each claim. There is insufficient antecedent basis for this limitation in the claim. For the prior art rejections below, the Examiner interprets the limitation to be "the frequent value list".

15. **Claim 4** recites the limitation "the intermediate dataset" in lines 8 and 19. There is insufficient antecedent basis for this limitation in the claim.

16. **Claim 4** recites the limitation "the predetermined threshold" in lines 13-14, 15-16 and 20-21. There is insufficient antecedent basis for this limitation in the claim.

17. **Claim 8** recites the limitation "the predetermined threshold" in lines 8-9, 10-11 and 15-16. There is insufficient antecedent basis for this limitation in the claim.

18. **Claim 14** recites the limitation "the intermediate" in line 2. There is insufficient antecedent basis for this limitation in the claim.

19. **Claim 14** recites the limitation “the frequent values list” in lines 7, 9 and 14. There is insufficient antecedent basis for this limitation in the claim.

20. **Claim 14** recites the limitation “the predetermined threshold” in lines 7-8, 9-10 and 14-15. There is insufficient antecedent basis for this limitation in the claim.

21. **Claim 14** recites the limitation “the intermediate dataset” in line 13. There is insufficient antecedent basis for this limitation in the claim.

22. **Claim 14** recites the limitation “the database table” in line 11. There is insufficient antecedent basis for this limitation in the claim.

23. **Claim 14** recites the limitation “the query” in lines 8, 9 and 15. There is insufficient antecedent basis for this limitation in the claim.

24. **Claims 3, 13, 15 and 16** are rejected because they depend on a rejected claim.

Dependent claims contain the limitations of the parent claims and are therefore rejected for the same reasons.

25. The prior art rejections below for claims 2-4, 8 and 12-16 are made as best understood in light of the 35 U.S.C. 112, second paragraph rejections addressed above.

#### ***Claim Rejections - 35 USC § 101***

26. 35 U.S.C. 101 reads as follows:

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title.

27. **Claims 1-16 are rejected under 35 U.S.C. 101** because the claimed invention is directed to non-statutory subject matter.

28. The basis of this rejection is set forth in a test of whether the invention is categorized as a process, machine, manufacture or composition of matter and if the invention produces a useful, concrete and tangible result. Mere ideas in the abstract (i.e., abstract idea, law of nature, natural phenomena) are found to be non-statutory subject matter. For a method claim to pass muster, the recited process must produce a useful, concrete and tangible result.

29. In the present case, **claims 1-3** recite an apparatus with a physical structure allowing it to be categorized in a statutory category of invention. However, the functionality of the system does not provide a useful, concrete and tangible result. Although the result is useful and concrete, as it allows one to improve optimization of queries using a formula, it is not tangible because there is no recitation as to what is done with the cardinality estimation once it has been calculated.

30. **Claim 4** is rejected for similar reasons.

31. **Claims 5-8** claim a method, however the steps fail to produce a useful, concrete and tangible result as explained above.

32. **Claims 9-16** claim a program product and are rejected for similar reasons above. Additionally, claims 9-16 recite a “computer readable signal bearing media”. A signal is not statutory as it can not be categorized in any of the statutory categories of invention. Since the computer readable signal bearing media comprises transmission media, such as a signal, as describe in the Specification on page 11, lines 22-23 and also claimed in claims 11 and 16, the program product of claims 9-16 are deemed nonstatutory.

To expedite a complete examination of the instant application, the claims rejected under 35 U.S.C. 101 (nonstatutory) above are further rejected as set forth below in anticipation of applicant amending these claims to place them within the four statutory categories of invention

***Claim Rejections - 35 USC § 103***

33. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

**34. Claims 1-16 rejected under 35 U.S.C. 103(a) as being unpatentable over Burger (US Patent Pub 2004/0059743) in view of Applicant's Admitted Prior Art (AAPA).**

35. In regards to **claim 1**, Burger discloses an apparatus comprising:

- a. at least one processor (Burger: para. 0015, lines 1-4);
- b. a memory coupled to the at least one processor (Burger: para. 0015, lines 4-8);
- c. a database table residing in the memory (Burger: para. 0015, lines 8-10); and
- d. an access module processor that collects statistical information on a sample size (intermediate dataset), such as data value frequencies, to determine data skew for feeding into a query optimizer (Burger: para. 0019; para. 0030; para. 0031, lines 1-5).

36. Burger does not expressly disclose a cardinality estimator residing in the memory and executed by the at least one processor, the cardinality estimator estimating cardinality of an intermediate dataset that satisfies a query to the database table in a manner that accounts for data skew in the database table.

37. AAPA discloses a prior art method and probabilistic formula for estimating cardinality of an intermediate dataset (AAPA: fig. 6; fig. 8).

38. Burger and AAPA are analogous art because they are directed to the same field of endeavor of query optimization.

39. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Burger by adding a cardinality estimator residing in the memory and executed by the at least one processor, the cardinality estimator estimating cardinality of an intermediate dataset that satisfies a query to the database table, as taught by AAPA, modified by the teachings of Burger in a manner that accounts for data skew in the database table.

40. The motivation for doing so would have been because data skew in statistic collection of database tables is not unusual. For query optimization to be effective, the statistical information given to the query optimizer must be accurate (Burger: para. 0017, lines 10-12; para. 0023). Thus, given the exiting prior art probabilistic formula for estimating cardinality, one of ordinary skill in the art would be apprised to modify it to account for data skew.

41. In regards to **claim 2**, Burger discloses:

- a. a frequent values list residing in the memory that contains a list of values in the database table, each value having a corresponding frequency (Burger: para. 0030, lines 4-12),
- b. determining whether a frequency corresponding to a value exceeds a predetermined threshold (Burger: para. 0031, lines 1-5), and

c. if the frequency exceeds the predetermined threshold, accounting for the corresponding value (Burger: para. 0031, lines 5-7).

42. Burger does not expressly disclose a cardinality estimator that estimates the cardinality of the intermediate dataset determining by performing the steps disclosed by Burger for determining frequency counts and additionally if the frequency does not exceed the predetermined threshold, using a formula to estimate the cardinality of the intermediate dataset, the formula accounting for data skew in the database table by subtracting the frequency of all values above the predetermined threshold in the frequent value table that satisfy the query from the total number of columns in the database table.

43. AAPA discloses the prior art method and probabilistic formula for estimating cardinality of an intermediate dataset (AAPA: Fig. 6; fig. 8).

44. Burger and AAPA are analogous art because they are directed to the same field of endeavor of query optimization.

45. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Burger by adding a cardinality estimator that estimates the cardinality of the intermediate dataset, taught by AAPA, by performing the steps disclosed by Burger for determining frequency counts and additionally if the frequency does not exceed the predetermined threshold, using a formula, taught by AAPA, to estimate the cardinality of the intermediate dataset, the formula modified by Burger's teachings for accounting for data skew in the database table by subtracting the frequency of all values above the predetermined threshold in the frequent value table that satisfy the query from the total number of columns in the database table.

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46. The motivation for doing so would have been because data skew in statistic collection of database tables is not unusual. For query optimization to be effective, the statistical information given to the query optimizer must be accurate (Burger: para. 0017, lines 10-12; para. 0023). Thus, given the exiting prior art probabilistic formula for estimating cardinality, one of ordinary skill in the art would be apprised to modify it to account for data skew.

47. In regards to **claim 3**, Burger discloses collecting statistics and determining characteristics of a database table given a query, wherein the characteristic is skew in the data caused by data values occurring more frequently than predetermined value. The collecting of statistics is meant for feeding into a query optimizer to determine the best query to be executed (Burger: para. 0005, lines 1-3; para. 0006, lines 5-7; para. 0017, lines 6-14; para. 0019; para. 0022, lines 4-9; para. 0023; para. 0030; para. 0031, lines 1-5).

48. Burger does not expressly disclose the cardinality estimator estimates the cardinality  $Ca'$  of the intermediate dataset using the formula:

$$Ca' = P + M (1 - (1 - 1/M)^Y)$$

where

$$M = Ca - (P+Q)$$

P = number of distinct values in the frequent values list above the predetermined threshold that satisfy the query;

Q = number of distinct values in the frequent values list above the predetermined threshold that do not satisfy the query;

Ca = cardinality of the database table;

$Y = X - F_i;$

$X$  = number of rows in the intermediate dataset; and

$F_i$  = sum of frequencies of values in the frequent values list above the predetermined threshold that satisfy the query.

49. AAPA discloses a formula in the form of:

$$Ca' = Ca \left(1 - \left(1 - \frac{1}{Ca}\right)^X\right)$$

Where

$X$  = Number of rows in the intermediate dataset (AAPA: Fig. 6).

50. AAPA further discloses that the formula in figure 6 is for estimating cardinality using a probabilistic formula, however it does not account for data skew (AAPA: pg. 7, lines 19-22; pg. 12, lines 12-15).

51. Burger and AAPA are analogous art because they are directed to the same field of endeavor of optimizing queries by collecting statistical information of the database table.

52. At the time of the invention, it would have been obvious to one of ordinary skill in the art to modify the apparatus of Burger by using the formula taught by AAPA, however modified by Burger's teachings to account for data skew.

53. The motivation for doing so would have been because data skew in statistic collection of database tables is not unusual. For query optimization to be effective, the statistical information given to the query optimizer must be accurate (Burger: para. 0017, lines 10-12; para. 0023).

Thus, given the exiting prior art probabilistic formula for estimating cardinality, one of ordinary skill in the art would be apprised to modify it to account for data skew.

54. **Claim 4** is a combination of claims 1-3 and is rejected for the same reasons.
55. **Claims 5-8** are substantially similar to claims 1-4 in the form of a method and are rejected for the same reasons.
56. **Claim 9** is substantially similar to claim 1 in the form of a program product and is jrected for the same reasons. Addressing the additional limitation, Burger discloses a computer-readable signal bearing media bearing the cardinality estimator (Burger: para. 0039).
57. In regards to **claim 10**, Burger discloses the program product of claim 9 wherein the computer-readable signal bearing media comprises recordable media (Burger: para. 0039).
58. In regards to **claim 11**, Burger discloses the program product of claim 9 wherein the computer-readable signal bearing media comprises transmission media (Burger: para 0040, lines 8-13).
59. **Claims 12-14** are substantially similar to claims 2-4 in the form of a program product and are rejected for the same reasons. Addressing the additional limitation of claim 4, Burger discloses a computer-readable signal bearing media bearing the cardinality estimator (Burger: para. 0039).
60. **Claims 15 and 16** are rejected for the same reasons as claims 10 and 11.

### *Conclusion*

61. The following are prior art made of record and not relied upon but is considered pertinent to applicant's disclosure.
62. Mozes (US Patent 6,732,085) discloses collecting statistics, including cardinality and detecting whether there is a data skew and accounting for it when collecting the statistics.

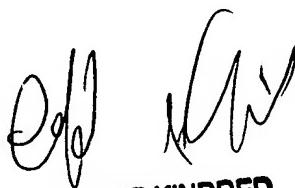
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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Michael Le whose telephone number is 571-272-7970. The examiner can normally be reached on Mon-Thurs : 9:30am-6pm, Fri: 8am-4:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don Wong can be reached on 571-272-1834. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Michael Le  
Art Unit 2163  
May 14, 2006



ALFORD KINDRED  
PRIMARY EXAMINER